EAST COAST RAILWAY

QUESTION PAPER FOR JE (MECHANICAL)

DATE OF EXAM – 10-02-2022

TIME- 2 HOURS

Please read the following instructions carefully before you begin to answer the questions

1. Question Paper consists of 150 questions.
2. All questions are objective type. There shall be 4 options against each question.
3. Each question carries one mark. For every correct answer, I mark will be allotted to examinee.
4. No Negative marking is there for wrong answer. Examinee can attempt/answer all the questions.
5. Any type of cutting, overwriting, erasing or changing of answers will not be evaluated and no marks will be given for such answers with corrections or overwriting.
6. The examinees are not allowed to bring mobile phones / calculator / electronic gadgets with them to the examination hall. Use of any paper, calculating machines and mobile phones etc. is completely prohibited and they will be disqualified for using it.
7. Candidates using unfair means will be removed from the selection process.

1. The process of maintaining the speed of a steam turbine constant for various load conditions is known as

(A) Governing (B) Bleeding (C) Cooling (D) Reheating

2. What do you mean by FRP?

(A) Fibre recalling panel
(B) First reduction plastic
(C) Fibre reinforced plastic
(D) Fine reinforced panel

3. What defect is detected in a UST test?

(A) Internal crack (B) external crack (C) Air flow crack (D) None of the above

4. In ABC analysis of items "A" category items represent

(A) Low value items
(B) High value items
(C) Important items
(D) Safety items

5. The material used for coating electrode is called

(A) Slag
(C) HAZ
(C) Inert gas
(D) Flux

6. 1 Micron is equal to

(A) 1 mm (B) 0.1 mm (C) 10 mm (D) 0.001 mm

7. In Arc welding, eyes need to be protected against

(A)Alpha rays
(B) IR and UV rays
(C) Beta rays
(D) None

8. Which of the following devices fitted in vehicles controls the air pollution?

(A) Inverter (B) Catalytic convertor (C) Carburettor (D) Radiator

9. The process of enlarging the holes to accurate sizes is called

(A) Drilling (B) Counter Boring (C) Reaming (D) Knurling

10. .....is the process of making flat surfaces on a lathe.

(A) Facing (B) Boring (C) Reaming (D) Knurling

11. In suction stroke piston travels in which direction in 4-stroke engine?

(A) Downward (B) Upward (C) Clockwise (D) Anti clockwise

12. A ball and a socket forms a

(A) Turning pair (B) Sliding pair (C) Screw pair (D) Spherical pair

13. Specific humidity is defined as

(A)Water vapour contained in air-vapour mixture per kg of dry air
(B) Water vapour contained per kg of air-vapour mixture
(C) Dry air contained per kg of air-vapour mixture
(D) None of the above

14. Work study is concerned with

(A) improving present method and finding standard time
(B) motivation of workers
(C) improving production capability
(D) None of these

15. Basic tool in work study is

(A) Graph paper (B) Process chart (C) Stop watch (D) None of these

16. Which of the following layouts is suited for mass production?

(A) Process layout (C) Fixed position layout

(B) Product layout (D) Plant layout

17. Which of the following layouts is suited to job production?

(A) Process layout (C) Fixed position layout

(B) Product layout (D) Plant layout

18. Graphical method, simplex method and transportation method are concerned with

(A) Break even analysis (C) Linear programming

(B) Queueing theory (D) Value analysis

19. The basic difference between PERT and CPM is that

(A) PERT deals with events and CPM with activities

(B) Critical path is determined in PERT only

(C) Costs are considered on CPM only and not in PERT

(D) Guessed times are used in PERT and evaluated times in CPM

20. PERT stands for

(A) Project evaluation and review technique

(B) Project examination and review technique

(C) Process execution and reporting technique

(D) Process execution and reporting technology

21. A dummy activity

(A) is represented by a dotted line (B) does not require any time

(C) All of the above (D) None of the above

22. The critical path of a network represents

(A) the minimum time required for completion of project

(B) the maximum time required for completion of project

(C) maximum cost required for completion of project

(D) minimum cost required for completion of project

23. The assumption in PERT is

(A) a project will always be behind schedule, if left uncorrected

(B) cost of project will always be more than the estimate, if no timely corrections are taken

(C) a project can be subdivided into a set of predictable, independent activities

(D) commissioning time can be changed, if activities are behind schedule

24. Positive slack on a PERT indicates that project is

(A) Ahead of schedule (C) beyond schedule

(B) as per schedule (D) on critical path

25. Ammonia-absorption refrigeration cycle requires

(A) very little energy input (C) same energy input as for vapour compression cycle

(B) maximum energy input (D) zero energy input

26. In vapour compression cycle, the condition of refrigerant is very wet vapour

(A) before passing through the condenser

(B) before entering the expansion valve

(C) before entering the compressor

(D) None of these

27. In vapour compression cycle, the condition of the refrigerant is high pressure saturated liquid

(A) before passing through the condenser

(B) before entering the expansion valve

(C) before entering the compressor

(D) None of these

28. One ton refrigeration is equal to the refrigeration effect corresponding to melting of 1000 kg of ice

(A) in 1 hour (B) in 1 minute (C) in 24 hours (D) in 10 hours

29. Critical temperature is the temperature above which

(A) a gas will never liquify (C) water will evaporate

(B) a gas will immediately liquify (D)None of the above

30. The value of COP in vapour compression cycle is usually

(A) always less than unity (C)equal to unity

(B) always greater than unity (D) Any one of the above

31. Where does the lowest temperature occur in a vapour compression cycle?

(A) condenser (B) Evaporator (C) Compressor (D) Expansion valve

32. Which of the following laws are applicable to ideal gas

(A) Boyle's law (B) Charles' law (C) Gay-Lussac law (D) All of these

33. According to the Kinetic theory of gases, the absolute zero temperature is attained when

(A) volume of the gas is zero (C) Kinetic energy of the molecules is zero

(B) Mass is zero (D) Specific heat of gas is zero

34. Work done in a free expansion process is

(A)positive (B) negative (C) Zero (D) Maximum

35. Which of the following is not a path function?

(A) heat (B)work (C) Both (D) None of these

36. Work done in an adiabatic process between a given pair of end states depends on

(A) the end states only

(B) the value of the index n

(C) particular adiabatic process

(D) None of these

37. The value of n=1 in the polytropic process indicates it to be

(A) Adiabatic process (C) free expansion process

(B) Isothermal process (D) Irreversible process

38. Work done is zero for

(A) constant volume (B) Free expansion (C)throttling (D) All of these

39. The working cycle in case of 4-stroke engine is completed in following number of revolutions of crankshaft

(A)2 (B) 1 (C) 4 (D) 8

40. In a diesel engine, the fuel is ignited by

(A) spark
(B) Injected fuel
(C) heat resulting from compressing air supplied for combustion
(D) combustion chamber

41. Supercharging is the process of

(A) supplying the intake of an engine with air at a higher density than that of surrounding atmosphere
(B) providing forced cooling air
(C)injecting excess fuel for raising more load
(D) raising exhaust pressure

42. Which of the following is incorrect?

(A) 4-stroke engine has 1 power stroke in 4 strokes
(B) thermal efficiency of 4-stroke engine is more than 2-stroke engine
(C) petrol engine works on otto cycle
(D) petrol engines occupy more space than diesel engine for same power output

43. Which of the following is not an internal combustion engine?

(A) 2-stroke petrol engine
(B) 4-stroke petrol engine
(C) Diesel engine
(D) steam engine

44. The property of material which enables it to resist fracture due to high impact load is known as

(A) Elasticity
(B) Strength
(C) Toughness
(D)Resilience

45. The fatigue life of a part can be improved by

(A) Electroplating (B) Polishing (C) Coating (D) Shot peening

46. Stress concentration in cyclic loading is more serious in

(A) Ductile materials
(B) Brittle materials
(C)Equally serious in both cases
(D) Unpredictable

47. A gear box is used

(A) to produce torque
(B) to damp out vibrations
(C) to obtain variable speed
(D) None of these

48. If 2 identical springs are in parallel, then their overall stiffness will be

(A) half (B) same (C) double (D) None of these

49. Shrink fit is a type of

(A) Clearance fit (B) Interference fit (C) Transition fit (D) None of these

50. The function of a governor in an engine is

(A) Speed control
(B) Turbocharging
(C) Supercharging
(D) Exhaust timing

51. Recrystallization temperature is one at which

(A) crystal start forming from molten metal when it is cooled
(B) new crystals first begin to form when a strained metal is heated

(C) change of allotropic form takes place

(D) crystals grow bigger in size

52. The unique property of cast iron is its high

(A) malleability (B) ductility (C) surface finish (D) damping characteristics

53. Break even analysis consists of

(A) fixed cost (B) variable cost (C) Both of these (D) None of these

54. Gnatt charts provide information about

(A) Break even analysis (C) material handling layout

(B) production schedule (D) Value analysis

55. Statistical quality control techniques are based on the theory of

(A) Quality (B) supply and demand (C)Probability (D) None of these

56. A differential in automobiles is used for

(A)Improving power distribution in wheels in an axle in curves (C) Acceleration of vehicle

(B)Fuel injection (D) None of these

57. The condition for stable equilibrium of a floating body is

(A) the metacentre should lie above the centre of gravity

(B) the metacentre should lie below the centre of gravity

(C)the metacentre should be below the body

(D) None of these

58. When a body floating in a liquid is displaced slightly, it oscillates about

(A) Centre of gravity (C) Centre of buoyancy

(B) Liquid surface (D) metacentre

59. VVVF drives are used in most modern machines. The full form of VVVF is

(A) Very Viscous Variable Frequency (C) Very Variable Viscous Frequency

(B) Variable Voltage Variable Frequency (D) None of these

60. Idler pulley is used for

(A) changing the direction of motion (C) applying tension

(B) increasing velocity ratio (D) All of these

61. If continuous rotation is to be converted to intermittent rotary motion, you would use

(A) Geneva mechanism (C) Bevel gear

(B) Differential (D) Hypoid gear

62. Which of the following is used in vehicles for reducing the bump at the centre of the car floor?

(A) Bevel gear (C) Differential

(B) Hypoid gear (D) Transmission shaft

63. On which of the following JIT manufacturing emphasize on?

(A) Manpower (C) Inventory

(B) Profit (D) Manufacturing

64. In the manufacturing of hole and shaft, the maximum shaft diameter was 49.88 mm and the minimum hole diameter was 49.94 mm. Which of the following is correct?

(A) Interference fit (C) Clearance fit

(B) Transition fit (D) None of these

65. The rate of heat flow is

(A) directly proportional to temperature gradient

(B) inversely proportional to temperature gradient

(C) does not depend on temperature gradient

(D) None of these

66. Carnot cycle is a

(A) Reversible cycle (B) Irreversible cycle (C) Quasi static cycle (D) None

67. Otto cycle consists of

(A)2 isentropics and 2 constant pressure (C) 2 isentropics and 2 constant volumes

(B) 2 isothermals and 2 isentropics (D) none

68. A perpetual motion machine is a

(A) thermodynamic machine (C) Both

(B) inefficient machine (D) None of these

69. Pareto analysis is a technique of

(A) identifying all causes of a failure

(B) identifying causes that are responsible for majority of the failures

(C) ensuring equal resource to all failures

(D) None of these

70. The first law of thermodynamics is the law of conservation of

(A) mass (B) energy (C) temperature (D) momentum

71. Thermal power plants work on the principle of

(A)carnot cycle (B)Otto cycle (C)Brayton cycle (D) Rankine cycle

72. The efficiency of a carnot engine depends on

(A) Working substance (C) size of engine

(B)temperature of source and sink (D) type of fuel

73. Heat pumps when used in place of resistive heaters

(A) reduce energy consumption (C) depends on climate

(B) enhance energy consumption (D) None of these

74. Which of the following is an irreversible cycle?

(A) Carnot (B) Stirling (C) Ericsson (D) None of these

75. According to Clausius statement of 2nd law of thermodynamics

(A) heat can't be transferred from low temperature to high temperature

(B) heat can't be transferred from low temperature to high temperature by refrigeration cycle

(C) heat can't be transferred from low temperature to high temperature without aid of external energy

(D) heat can't be transferred from low temperature to high temperature if COP is more than unity

76. In Electro Discharge machining, the tool is completely submerged in a fluid that is electrically

(A) Conducting (B) Non conducting (C) Super conducting (D) None of these

77. Cold working distorts the grain structure

(A) True (B) False(C) Depends on material (D) Depends on method used

78. The increase in hardness due to cold working is called

(A) Age hardening (B)Work hardening(C) Induction hardening (D) Flame hardening

79. The process used to improve fatigue resistance by setting up compressive stresses in its surface, is known as

(A) Hot piercing (B)Extrusion (C) Cold peening (D) Cold heading

80. Knurling is used to

(A) improve the surface finish (C) reduce the diameter

(B) remove sharp edges (D) improve the handling and grip

81. The purpose of a riser is to

(A) deliver molten metal into the mould cavity

(B) feed the molten metal to the casting in order to compensate for the shrinkage

(C) deliver the molten metal from the pouring basin to gate

(D) form internal cavities in the casting

82. Broaching is used for making of

(A) keyways (B) flat surfaces (C) Cotters (D) Tubes

83. Discontinuous chips are formed in machining of

(A)brittle metals (B) ductile metals (C) hard metals (D) soft metals

84. DH parameters in robotics refers to

(A) method of calculating energy requirement

(B) method of finding the length of linkages

(C) method of finding the capacity of drives used

(D) method of standardizing the coordinate frames for spatial linkages

85. The full form of NURBS is

(A) Non Uniform Related Battery Shaper

(B) New Upmilling Related Base Shaper

(C) Non Uniform Rational Basis Spline

(D) None of these

86. A closed loop control system refers to a system where

(A) a feedback mechanism does not exist

(B) intensive human interaction is necessary

(C) system and output are not well defined

(D) a feedback mechanism exists to control input for desired output

87. A perfect black body is one which

(A) reflects all heat (C) transmits all heat radiations

(B) fully opaque (D) absorbs heat radiations of all wavelength falling on it

88. If a=absorptivity, p=reflectivity, x=transmissivity, a body is opaque when

(A) p=0,x=0,a=0 (B) p=1,x=0,a=1 (C) p+a=1,x=0 (D) p=0,x=1,a=0

89. Pythagoras cup works on the same principle as

(A) Two way valve (B) Bell siphon (C) venturi meter (D) Flow meter

90. Heat and work are

(A) point function (B) system properties (C) path functions (D) None of these

91. Which is the highest civilian award in India?

(A) Veer Chakra (B) Ashok Chakra (C) Bhumi Putra (D) Bharat Ratna

92. The ICF flagship rake Train 18 was launched as

(A) Deen Dayalu Express
(B) Vande Bharat Express
(C) Swarn Shatabdi Express
(D) Prayagraj Express

93. Hirakud Dam is built across the ·····River

(A) Narmada (B)Krishna (C)Mahanadi (D) None of the above

94. How many languages are recognized for official use in the constitution of India?

(A)10 (B) 22 (C) 12 (D) 30

95. Full form of MSP is

(A) Maximum support price
(B) Minimum support price
(C) Minimum support premium
(D) Maximum support premium

96. Full form of TRP is

(A) Television Rating Point
(B) Telepathy Rating Point
(C) Tier Rating Point
(D) Tier Rating Pointer

97. Who's the current US vice President?

(A) Kamala Harris
(B) Shyamala Gopalan Harris
(C) Joe Biden
(D) Anthony Fauc

98. Delivery of 36 Rafales started on 27 July 2020 with first 5 Rafales delivered to Indian Air Force from France. They are designed and built by which company?

(A) Dassault Aviation
(B) Boeing
(C) Lockheed Martin
(D) Airbus

99. Indonesia Embassy designated a room to former chief minister of India..... to commemorate his contribution to the freedom struggle of Indonesia.

(A)Jyoti Basu (B)Biju Patnaik (C) Sheila Dikshit (D)J. Jayalalithaa

100. Serum Institute of India is an Indian biotechnology and pharmaceuticals company. It is the world's largest vaccine manufacturer. Who is the CEO of the company?

(A) Adar Poonawalla
(B) Ratan Tata
(C) Mukesh Ambani
(D) Dr. Krishna M. Ella

101. When was the first railway line opened in India?

(A)1851 (B) 1852 (C)1853 D) 1854

102. Full form of RTPCR is

(A) Reverse transcription polymerase chain reaction
(B) Reverse transcription polygraph chain reaction
(C) Reverse transcription polygraph check reaction
(D) Repeat transcription polymerase chain reaction

103. The nesting site of rare Olive Ridley turtles is located at

(A) Sundarbans (B) Polavaram (C) Kaiga (D) Gahirmatha

104. Who was Known as human computer?

(A) S. Ramanujam (B) Sakuntala Devi (C) Homi Bhabha (D) Sun Tzu

105. Swachh Bharat Abhiyan was launched in the year

(A) 2015 (B) 2016 (C) 2014 (D) 2017

106. Which of the following words were not a part of the original Preamble of the Indian constitution?

(A) Sovereign (B) Socialist (C) Republic (D) Secular

107. The Liberation of Goa from Portuguese rule was done by armed action codenamed

(A) Operation Polo (B) Operation Vijay (C) Operation Meghdoot (D) None

108. The armed action against the Princely state of Hyderabad in 1948 was codenamed

(A) Operation Polo (B) Operation Vijay (C) Operation Meghdoot (D) None

109. Raisina Hills is the official residence of

(A) Chinese President (B) Indian President (C) Afghan President (D) French President

110. The movie "Border" was inspired by which real life incident?

(A) Battle of Asal Uttar (C) Battle of Longewala

(B) Battle of Kashmir (D) Operation Meghdoot

111. In a forest, 2/3 of all trees are conifer and the rest are leaf-bearing. Among the leaf-bearing tress, 2/5 are oak and 2/3 of these oaks are new. There are 160 old oaks in the forest. How many trees in all are in the forest?

(A) 2400 (B) 1800 (C) 3200 (D) 3600

112. The volumes of two cubes are in the ratio 8:27. The ratio of their surface area is

(A) 2:3 (B)3:2 (C)4:9 (D) 9:4

113. The largest 4-digit number which when divided by 6,9,12,15 and 18 leaves 1 as reminder in each case is

(A) 9901 (B) 9899 (C) 1081 (D) 9973

114. A certain sum amount to Rs. 5832 in 2 years at 8% per annum compounded annually, the sum is

(A) 5000 (B) 5200 (C) 5280 (D) 5400

115. If $a+b=5$, $a^2+b^2=13$, the value of a-b (a>b) is

(A) -2 (B)2 (C) 1 (D)-1

116. The digit in unit's place of the product 49237 X 3995 X738 X 83X 9 is

(A) 7 (B) 0 (C) 5 (D) 6

117. $3x+2y=12$ and $xy=6$, then the value of $9x^2+4y^2$ is

(A) 132 (B) 108 (C)74 (D) 72

118. If $a+b=8$, $a-b=4$, then a^2+b^2 is equal to

(A) 20 (B) 40 (C) 10 (D) 30

119. The HCF of x^2-y^2 and x^3-y^3 is

(A) x-y (B) x^3-y^3 (C) x^2-y^2 (D) $(x+y)(x^2+xy+y^2)$

120. The cost price of 18 articles is equal to the selling price of 15 articles. The profit is

(A) 25% (B) 20% (C) 18% (D) 15%

121. If x earns 25% more than y, then what percent less does y earn than x?

(A) 16% (B) 10% (C) 20% (D) 25%

122. If A and B are in the ratio 3:4 and B and C are in the ratio 12:13, then A and C are in the ratio

(A) 3:13 (B) 9:13 (C) 36:13 (D) 13:3

123. If A and B together can complete a piece of work in 15 days and B alone in 20 days, in how many days can A complete the work alone?

(A) 60 (B) 45 (C) 40 (D) 30

124. Ajit has a certain average for 9 innings. In the 10^{th} innings, he scores 100 runs thereby increasing his average by 8 runs. His new average is

(A) 20 (B) 21 (B) 28 (D) 32

125. The sum of ages of 5 children born at the interval of 3 years each is 50 years. What is the age of the youngest child?

(A) 4 years (B) 8 years (C) 10 years (D) 3 years

126. The present ages of Sameer and Anand are in the ratio 5:4. Three years hence, the ratio of their ages will become 11: 9. What is Anand's present age in years?

(A) 27 (B) 24 (C) 40 (D)6

127. 3 pumps working 8 hours a day, can empty a tank in 2 days. How many hours a day must 4 pumps work to empty the tank in 1 day?

(A) 9 (B) 10 (C) 11 (D)12

128. Running at the same constant rate, 6 identical machines can produce a total of 270 bottles per minute. At this rate, how many bottles could 10 machines produce in 4 minutes?

(A) 648 (B) 1800 (C)2700 (D) 10800

129. The ratio in which tea costing Rs. 192 per kg is to be mixed with tea costing Rs. 150 per kg so that the mixed tea when sold at Rs. 194.40 per kg results in 20% profit, is

(A) 2:5 (B)3:5 (C) 5:3 (D) 5:2

130. In a 729 litres mixture of milk and water, the ratio of milk to water is 7:2. To get a new mixture containing milk and water in the ratio 7:3, the amount of water to be added is

(A) 81 litres (B) 71 litres (C) 56 litres (D) 50 litres

131. Looking at the portrait of a man, Sanjay said," His mother is the wife of my father's son. Brothers and sisters, I have none". At whose portrait was Sanjay looking?

(A)His son (B) His nephew (C) His cousin (D) His uncle

132. A man said to a lady," The son of your only brother is the brother of my wife." What is the lady to the man?

(A)Mother (B) Sister (C) sister of father-in-law (D)Grandfather

133. Float:Boat::Sink:

(A) Ship (B) Missile (C) Submarine (D) War

134. Interest:Moneylender:: Salary:

(A) Zamindar (B) Employee (C) Employer (D) Prisoner

135. A man walks 1 km to East and then he turns to South and walks 5 kms. Again he turns to East and walks 2 km. After this he turns to North and walks 9 km. How far is he from his starting point?

(A) 3 km (B) 4 km (C) 5 km (D) 7 km

136. Find the odd one out

(A) Swimming (B) Sailing (C) Diving (D) Driving

137. Choose the word that is different from the rest

(A) Cap (B) Turban (C) Veil (D) Helmet

138. Find the next number in the series: 4,7,12,19,28,·····

(A) 49 (B) 36 (C) 30 (D) 39

139. Find the next number in the series: 6.11.21.36,56,·····

(A) 91 (B) 51 (C) 81 (D) 42

140. A man walks 5 km towards south and then turns to the right. After walking 3 km, he turns to the left and walks 5 km. What is his direction from the starting point?

(A) West (B) South (C) North-East (D) South-West

141. Rahul put his timepiece on the table in such a way that at 6 pm, hour hand points to North. In which direction the minute hand will point at 9:15 pm?

(A)South-East (B) South (C) North (D) West

142. Jayant walked 15m towards west. He turned left and walked 20m. He then turned left and walked 15m. After this, he turned to his right and walked 12m. How far and in which direction is he from his starting point?

(A) 32m, South (B)47 m, East (C) 42m, North (D) 27m, South

143. The total of the ages of Ram, Shyam and Hari is 80 years. What was the total of their ages 3 years ago?

(A) 71 years (B) 72 years (C) 74 years (D) 77 years

144. Today is Varun's birthday. One year, from today he will be twice as old as he was 12 years ago. How old is Varun today?

(A) 20 years (B) 22 years (C) 25 years (D) 27 years

145. Jaga was asked how many marbles he had. He replied that there were all blue but six, all red but six, and all green but six. How many marbles did he have?

(A) 9 (B)18 (C) 27 (D) 36

146. Raghu is ranked ninth from the top and thirty-eight from the bottom in a class. How many students are there I the class?

(A)45 (B)46 (C) 47 (D)48

147. A is three times as old as B. C was twice as old as A four years ago. In four years' time, A will be 31 years. What are the present ages of B and C?

(A) 9,46 (B)9,50 (C)10,46 (D)10,50

148. In a class, 3/5 of the students are girls and rest are boys. If 2/9 of the girls and ¼ of the boys are absent, what part of the total students is present?

(A) 17/25 (B) 18/49 (C)23/30 (D)None of these

149. A is 3 years older to B and 3 years younger to C, while B and D are twins. How many years older is C to D?

(A) 2 (B) 3 (C) 6 (D) 12

150. 12 year old Manik is three times as old as Rahul. How old will Manik be when he is twice as old as Rahul?

(A) 4 years (B) 16 years (C) 18 years (D) 20 years